

Comments and Response

1. Applicant was duly advised by the Examiner in the above referenced **April 10, 2002** non-final office action that:

- a) the claim for priority under 35 U.S.C. §119 is acknowledged and that certified copies of priority documents have been received and are now of record;
- b) the Examiner has considered the art listed on and returned an initialed copy of form 1449;
- c) Applicant, via 3-2-02 teleconference, has elected without traverse to prosecute claims 1-5 and claims 6-15 are withdrawn from consideration;
- d) the drawings is objected to for failing to comply with 37 CFR 1.84(p)(5);
- e) Claim 2 is objected to because of informalities at line 2 (--through-- needs to be added between "passing" and "a");
- f) Claim 5 is objected to because of informalities at line 3,4,5,and 6;
- g) Claims 1-5 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicant regards as the invention;
- h) Claims 1-4 are rejected under 35 U.S.C. 102(a) as being anticipated by Takubo et al. (U.S. Patent No. 6,329,610); and
- i) Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Takubo et al (U.S. Patent No. 6,329,610).

2. In view of the comments below Applicant respectfully requests that the Examiner reconsider the present application including rejected claims 1-4 and new claims 16 – 24.

Withdrawn claims 6-15 are herewith canceled without prejudice. No new matter has been added with any of the amendments to claims 1-4 or new claims 16-24. In accordance with rule 37 C.F.R. 1.121 and for the Examiner's convenience the Applicant has enclosed herewith a copy of the claims as amended showing any material added or deleted.

a), b), c) Applicant notes with appreciation the acknowledgment of the claim to priority under §119 and that the priority documents are now of record. Applicant further notes with appreciation that the Examiner has returned an initialed form 1449. Applicant concurs and affirms that claims 6-15 have been withdrawn by election via teleconference on 3-22-02 and hereby cancels such claims.

d) The drawings are objected to for failing to comply with 37 CFR 1.84(p)(5). Applicant respectfully submits that the above amendments to the specification that add reference numerals to the 3rd paragraph on page 9 have successfully traversed this rejection and thus respectfully requests that the Examiner reconsider and withdraw this objection to the drawings under 37 CFR §1.84(p)(5).

e) Claim 2 is objected to because of informalities at line 2 (--through-- needs to be added between "passing" and "a". Applicant has amended claim 2 to include the Examiner's suggestions. Thus Applicant respectfully requests that the Examiner reconsider and withdraw this objection to claim 2.

- f) Clam 5 is objected to because of informalities at line 3, 4 ,5, and 6. Claim 5 has been canceled thus rendering this objection moot.
- g) Claims 1-5 stand rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicant regards as the invention. Claims 1 and 2 have been amended and claim 5 has been cancelled. Applicant respectfully submits that the amendments to claim 1 and cancellation of claim 5 have successfully traversed this rejection under 35 U.S.C. §112 2nd paragraph and thus respectfully requests that the Examiner reconsider and withdraw this rejection based on 35 U.S.C. §112 2nd paragraph.
- h) -i) Claims 1-4 stand rejected under 35 U.S.C. 102(a) as being anticipated by Takubo et al. (U.S. Patent No. 6,329,610). Claim 5 stands rejected under 35 U.S.C. 103(a) as being unpatentable over Takubo et al (U.S. Patent No. 6,329,610). Applicant respectfully disagrees with the Examiner's construction of this reference as noted and for the reasons noted below. Although claim 5 has been canceled thus procedurally rendering the 103(a) rejection moot, Applicant has amended claim 1 to include the essential limitations of claim 5 and has added certain new claims with varying limitations that will benefit from a detailed appreciation of the Takubo et al reference.

The Examiner notes that Takubo et al. does not teach a unified conductive paste (compound) having a first metal and a second metal and so on and then argues that all of the missing teachings would be obvious since alloys and through holes are well known (see paragraph #13, page 7 of the office action) without citing a reference. Applicant respectfully disagrees and requests, pursuant to MPEP 2144.03, that the Examiner provide a reference showing the claimed unified conductive compound structure, purposes and results as claimed in amended independent claim 1, and new independent claims 17 and 20.

The Examiner further relies on an after the fact inherency argument to conclude that Takubo et al teaches that the conductor pattern is electrically interconnected with a solid phase diffusion layer that is formed by mutual solid phase diffusion between the metal making up the conductor pattern and the first metal in the conductive compound. Applicant respectfully submits that this is an improper argument to support a rejection and further disagrees with the Examiner's construction for the reasons noted below.

Applicant agrees that Takubo et al clearly does not teach the unified conductive paste (compound) as explained below. The unified conductive compound as noted at page 10, line 5 et sequence of the present disclosure includes a first metal and a second metal that has a higher melting point than a heating temperature required for interconnecting the conductor patterns; where the conductor patterns are electrically interconnected by the unified conductive compound, which is an alloy obtained by sintering particles made of the same metal as the first metal and particles made of the same metal as the second metal, and the solid phase diffusion layers, which are obtained by mutual solid phase diffusion between the same metal as the metal included in the

conductor patterns and the same metal as the first metal included in the conductive compound. Therefore, the electrical connection of the conductor patterns does not rely merely on mechanical contact, so the interlayer contact resistance barely changes with stress and higher reliability of the connection results (lines 23-26, page 13 in the specification).

In stark contrast, in Takubo et al. the electrical connection between the wiring layer 11, 12, 13, 14, (equivalent to the conductor pattern in Applicant's invention) and the conductive pillar 31, 32, which is deemed by the Examiner to be equivalent to the unified conductive compound in the present invention, is obtained by exposing a head portion of the conductive pillar on the insulation layer, plastic-deforming and crushing the head portion, and further plastic-deforming the conductive pillar (column 7, lines 38-40, column 21, line 66-column 22, line 8, column 22, lines 49-55, Figs. 4D-4F).

Takubo et al does not show or suggest the first metal, the second metal, thus the unified conductive compound which is an alloy obtained by sintering particles made of the first metal and particles made of the second metal, or the solid phase diffusion layers, which are obtained by mutual solid phase diffusion between the same metal as the metal included in the conductor patterns and the same metal as the first metal included in the conductive compound.

For these reasons Applicant respectfully urges that the cited reference does not show or suggest all of the limitations of independent claim 1 and thus does not support the 35 U.S.C. §102(a) rejection of that claim as amended and further does not properly support a 35 U.S.C. §103(a) based rejection of amended claim 1 and by dependency claims 2-4. For these reasons

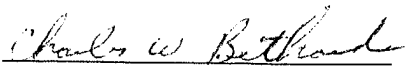
Applicant respectfully requests that the Examiner reconsider and withdraw the above noted rejection of claim 1 and dependent claims 2-4 under 35 U.S.C. §102(a) based on the Takubo et al. reference.

j) New claims 16 – 24 are also believed to be allowable. Claim 16, 23, and 24 are dependent on claim 1 and by dependency are believed to be allowable. New independent claim 17 and 20 are believed to be allowable for one or more of the reasons noted above with respect to claim 1. The remaining new claims are dependent on one of claims 17 and 20 and by dependency are also believed to be allowable.

Accordingly, Applicant respectfully submits that the claims, as amended, clearly and patentably distinguish over the cited reference of record and as such are to be deemed allowable. Such allowance is hereby earnestly and respectfully solicited at an early date. If the Examiner has any suggestions or comments or questions, calls are welcomed at the phone number below.

Please charge Deposit Account No. **50-1147** in the amount of \$400.00 for the two month extension of time as specified. Please charge any additional fees or credit overpayment to Deposit Account No. **50-1147**.

Respectfully submitted,


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**Specification Shown with Amendments
For Amendment Filed September 10, 2002**

Paragraph on page 9, line 8:

The cover layer 36a is machined to provide a hole 39a through which an electrode 32 is exposed in a predetermined position of the conductor pattern 22 on the top layer, and so is the cover layer 36b to provide another hole 39a through which an electrode 37 is exposed in a predetermined position of the conductor pattern 22 on the bottom layer. In this embodiment, the same resin film as for the resin film 23, which is a thermoplastic film with 25 - 75 μ m thickness, made of a mixture of 65 - 35 % polyetheretherketone resin and 35 - 65 % polyetherimide resin, is used for the cover layers 36a and 36b.



Serial No. 10/022,222

**Claims Shown with Amendments
For Amendment Filed September 10, 2002**

1. (Once Amended) A printed wiring board comprising:

an insulator board having a via-hole;

a pair [plurality] of conductor patterns formed on the insulator board; and

a unified conductive compound [paste] provided in the via-hole and electrically interconnecting the pair of conductor patterns,

wherein a sidewall of the unified conductive compound in the via-hole has a shape [an inclination of a side wall thereof, which is adjacent to an area contacting the conductor pattern, against the conductor pattern] in such a manner that the farther from the conductor patterns on the sidewall [side wall], the closer to a [the] center axis of the via-hole;

the pair of conductor patterns including a metal;

the unified conductive compound comprises a first metal and a second metal having a higher melting point than a heating temperature required for interconnecting the conductor patterns; and

the conductor patterns are electrically interconnected using solid phase diffusion layers that are formed by mutual solid phase diffusion between the same metal as the metal in the conductor patterns and the same metal as the first metal in the conductive compound.

2. (Once Amended) The printed wiring board as in claim 1, wherein the side wall of the conductive compound has an arch shape on a cross-sectional plane passing through a center axis of the via-hole.